

# Web-based Medical Imaging and Clinical Trial Data Repository

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Center for Information Technology

National Institutes of Health

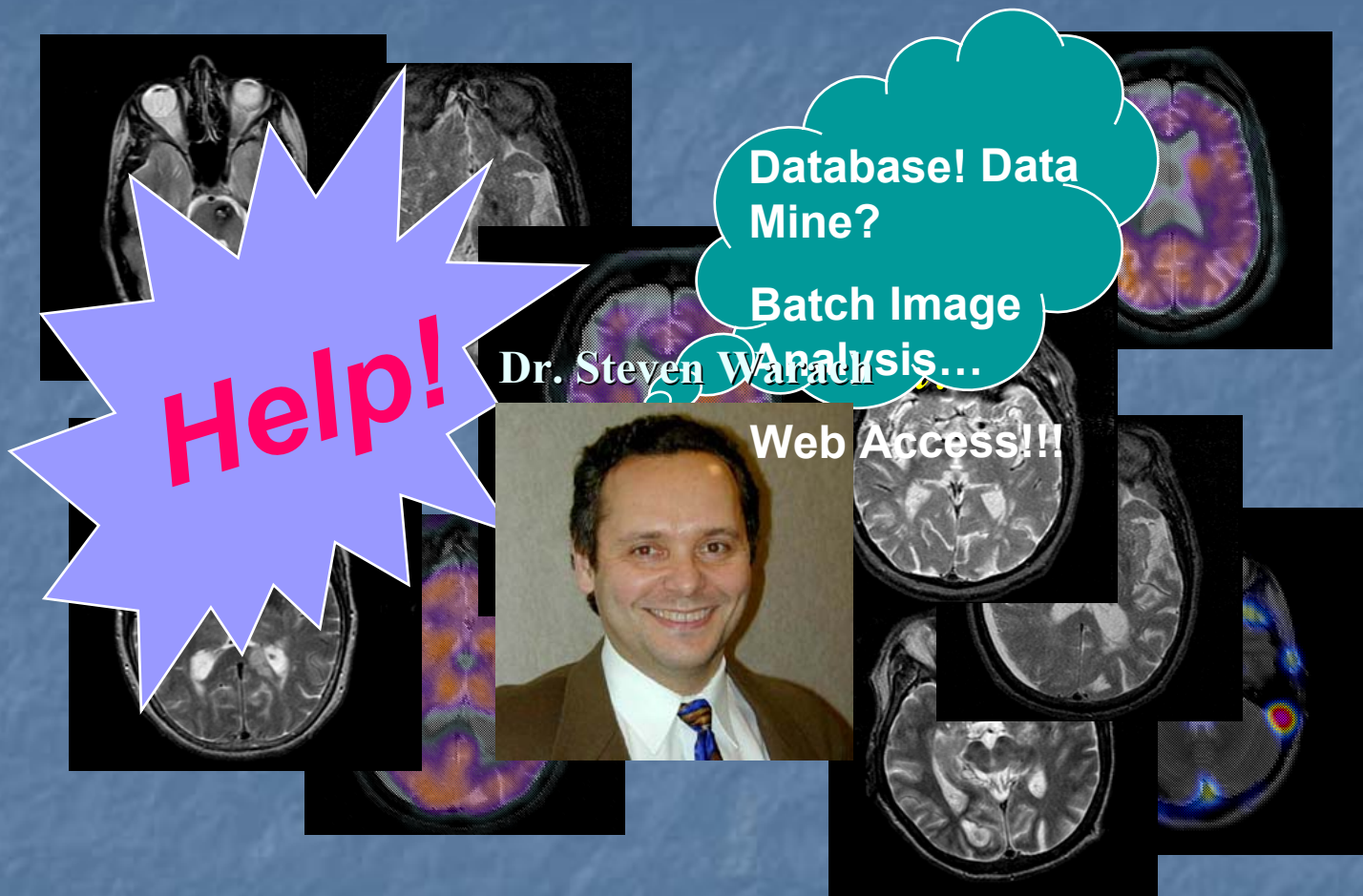
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Web-based Repository System  
for the National Institute of Neurological  
Disorders and Stroke (NINDS)

# Outline

- Background and Goal
- Client-Server System Architecture
- Middleware Implementation
- Database System Layout
- System Security
- Web-based Repository
- Software Tools
- Summary
- Future Works



**Help!**

Dr. Steven Warach

**Database! Data  
Mine?**

**Batch Image  
Analysis...**

**Web Access!!!**



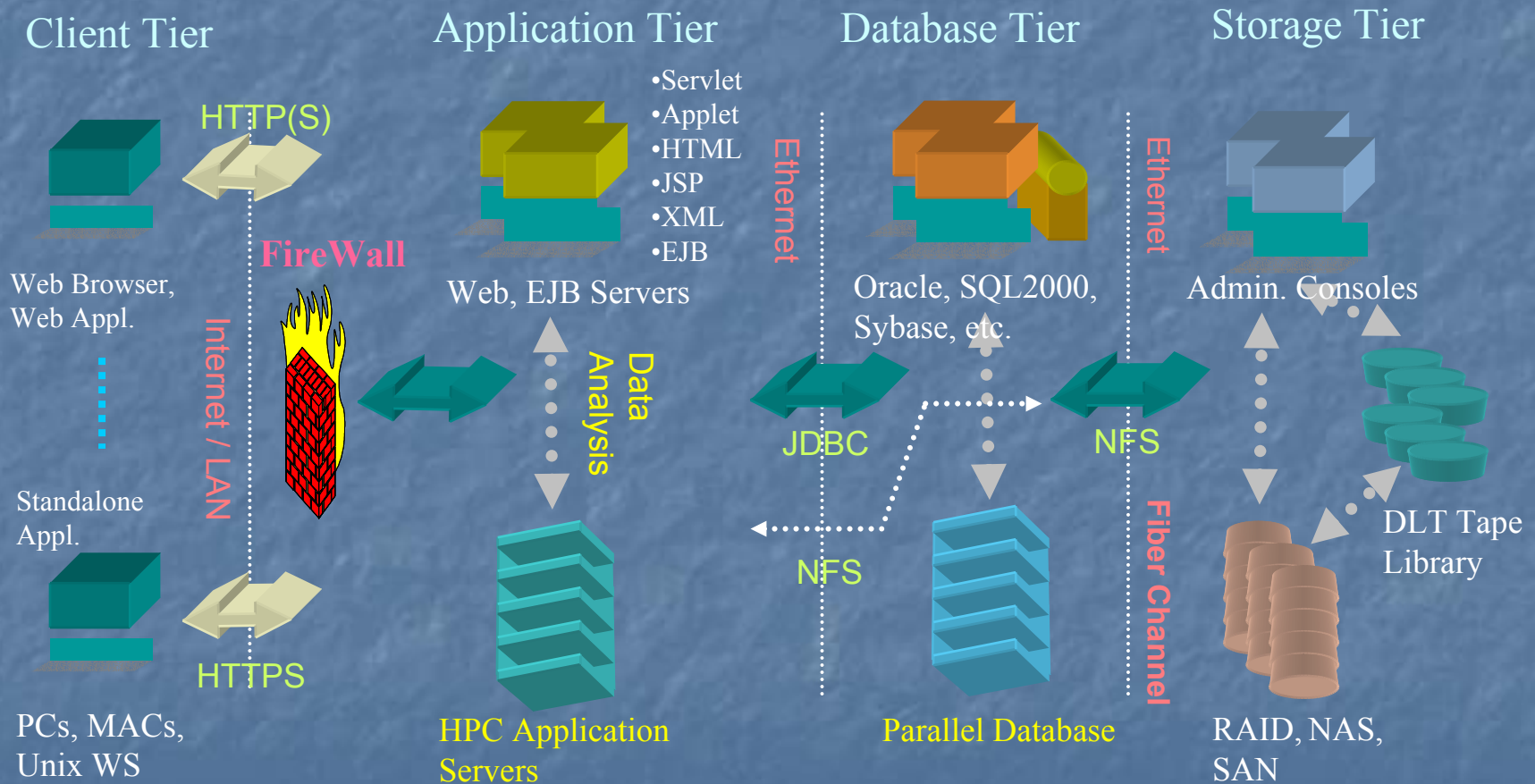
# Background

- NINDS needs to store, access and manage medical images and data obtained from clinical trials
  - Discover biomarkers for disease states, determine the genetic origin of disease, evaluate the results of clinical trials, and identify promising stroke therapies through the use of imaging surrogate markers

# Goal

- Develop a Web-based repository system to store and manage medical imaging and clinical trial data
  - Multi-tier client-server system, using commodity hardware and software components
  - Scalable database and storage system design to accommodate large volumes of data
  - Integration of multiple databases as a single repository accessible via secure Web

# Client-Server System Architecture



# Client Tier



Windows



MAC



Linux



Solaris



SGI



## Web Browser

- Forms, Reports



## Web-based Applications

- Image Upload/Download
- Applet Tools

## Standalone Applications

- Patient Information Randomizer
- Image File Manager
- Image Processing

## Online Transaction Requests

- Forms, Reports
- Upload/Download

## Database Search Tools

- Query across Multiple DBs
- Configurable Queries
- *Meta-data Search*

## Data Analysis Tools

- *Data Mining*
- *Visualization*
- File Manager
- Image Processing

## System Management

- User Management
- System Admin.

Internet, TCP/IP  
HTTP, SSL

## Advantages

- Simple, Ubiquitous
- Platform Independent
- Standard, Commodity
- Secure, Transparent



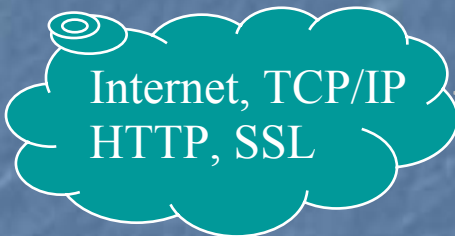
# Application Tier

## Online Transaction Request

- Forms, Reports
- Upload/Download

## Database Search Tools

- Query across Multiple DBs
- Configurable Queries
- *Meta-data Search*



## Data Analysis Tools

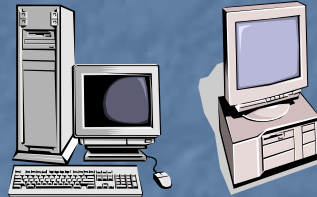
- *Data Mining*
- *Visualization*
- File Manager
- Image Processing

## System Management

- User Management
- System Admin.

- Servlet
- Applet
- HTML
- JSP
- EJB
- *XML*

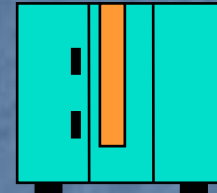
Linux, UNIX, *PC, MAC*



Web Server

- Apache
- *Netscape*

*Linux Cluster/SMP*



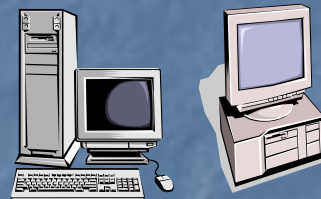
JDBC, NFS

*3D Reconstruction*  
*Image Processing*  
*Data Mining*

**FireWall**



PC, MAC, Linux, UNIX



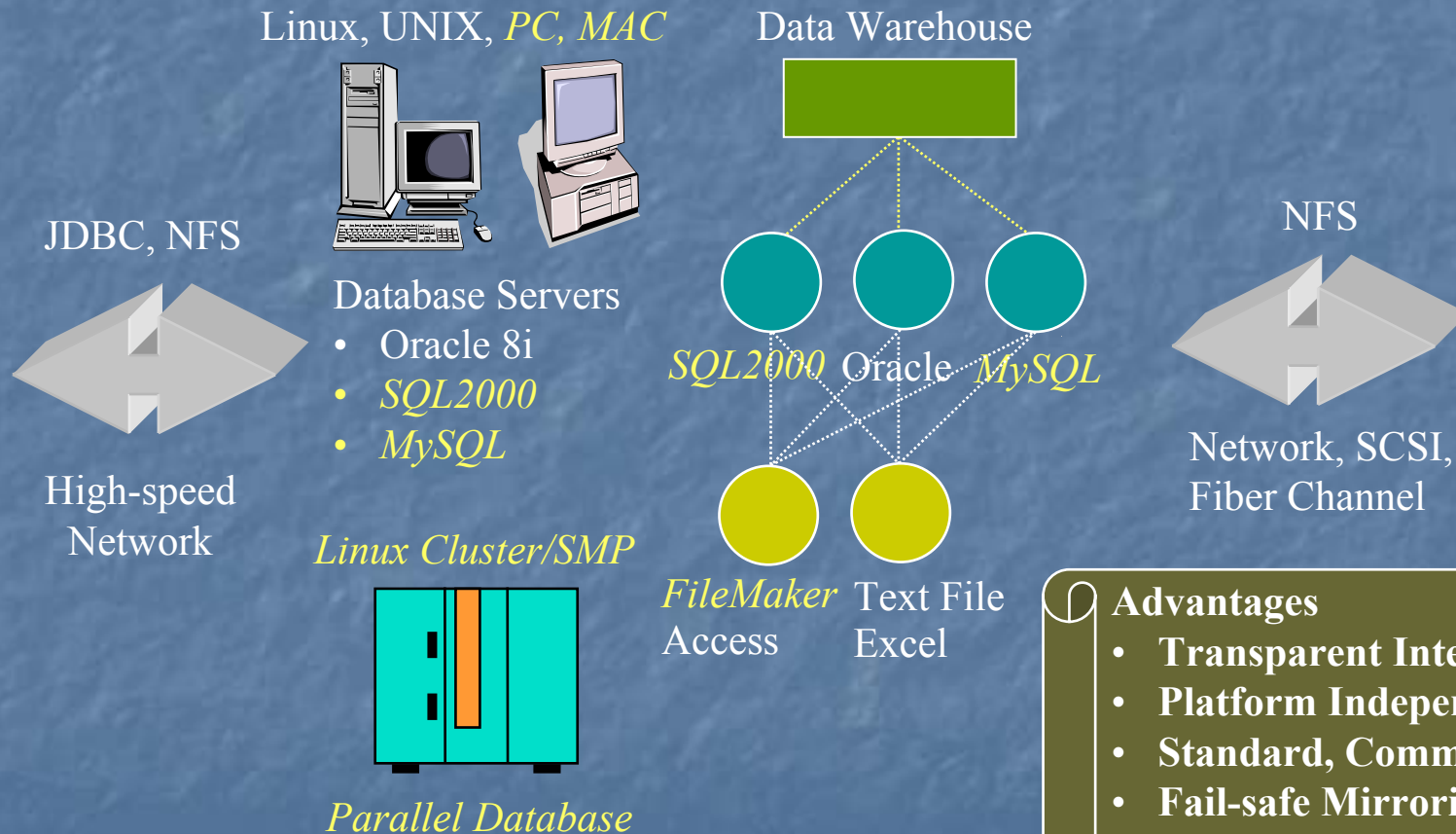
Application Server

- WebSphere
- *WebLogic*
- *ColdFusion*

## Advantages

- Workload Distribution
- Platform Independent
- Standard, Commodity
- Secure, Transparent
- Fail-safe Mirroring
- High Throughput

# Database Tier

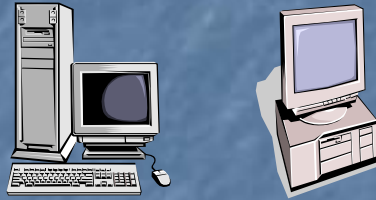


## Advantages

- **Transparent Integration**
- **Platform Independent**
- **Standard, Commodity**
- **Fail-safe Mirroring**
- **High Throughput**

# Storage Tier

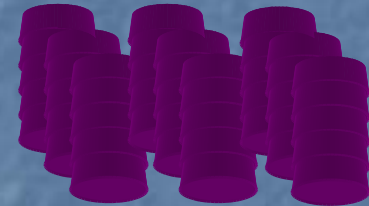
Linux, UNIX, *PC, MAC*



Admin. Consoles



*DVD Near-line Storage*



Parallel Storage System

NFS



Network, SCSI,  
Fiber Channel



Network Attached  
Storage



High-speed  
Backup



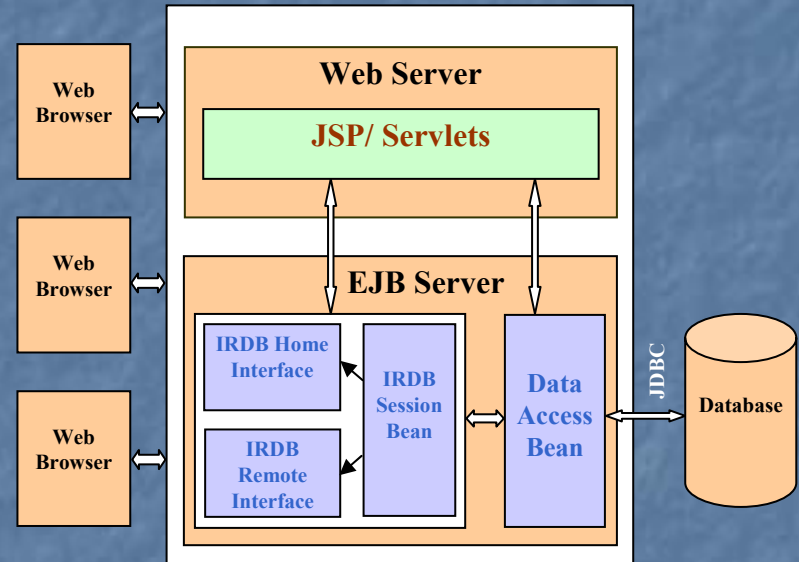
*Storage Area  
Network*

## Advantages

- **Transparent Integration**
- **Platform Independent**
- **Standard, Commodity**
- **High Throughput**
- **Security**

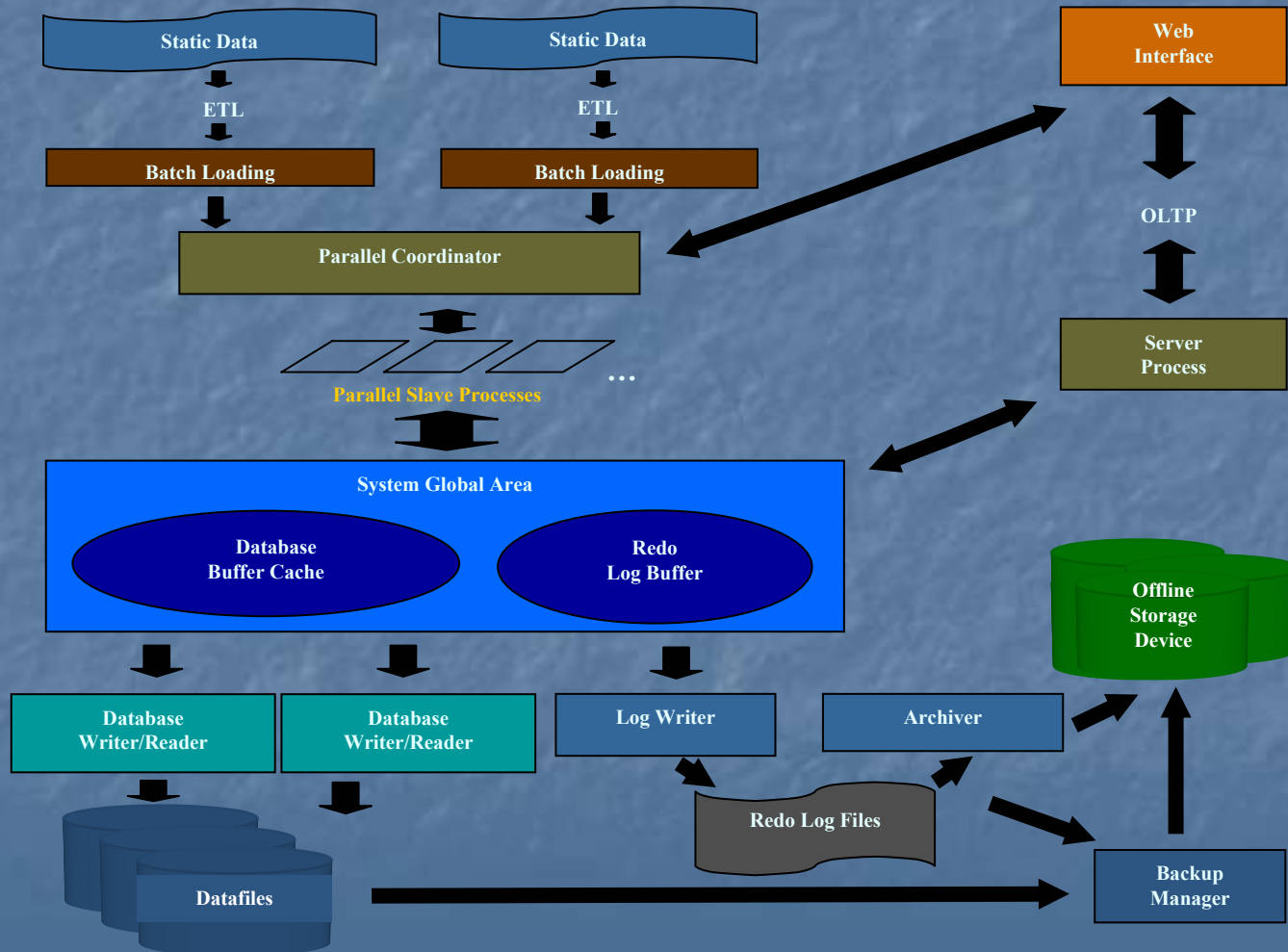
# Middleware Implementation

- The secure Web server and the Enterprise Java Beans (EJB) application server manage the entire workflow process from the user authentication to the data transaction.
- The user interface is provided through HTML and JSP pages for the storage, query, and retrieval of data in-and-out of the database.
- When the user presents a request to access the database, the JSP and/or servlet invoke the appropriate business logic implemented as an EJB component hosted on the EJB container.
- The EJB components access the database using JDBC to perform the requested service and returns results.
- The EJB server handles all the low-level details including database read and write operations.






# Database System Layout



# System Security

- Firewalls, secure socket layer communication, 128-bit RC4 strong password encryption, failed login locking mechanism, data access level controls (Kerberos), and intrusion detection systems

# Web-based Repository





## NIH Medical Image Archive System

National Institute of Neurological Disorders and Stroke

This **NINDS Medical Image Archive System (NMIAS)** is developed and maintained by the **Division of Computational Bioscience** of the **Center for Information Technology** for the **National Institute of Neurological Disorders and Stroke** at the **National Institutes of Health**.

**Notice:** This is a restricted U.S. Government Website and any unauthorized access is prohibited. Accounts on this server are restricted to the registered NIH users and research collaborators only.


| Administration  | Archive  | Resources  |
|---|--|--|
| <ul style="list-style-type: none"><li>User Login</li><li>Registration</li><li>Change Password</li><li>Terms Of Service</li><li>Access Policy</li><li>Disclaimers</li><li>Logout</li></ul> | <ul style="list-style-type: none"><li>Suburban Study<ul style="list-style-type: none"><li>Clinical Pages</li><li>Image &amp; Data Query</li></ul></li><li>GAIN Study</li><li>Stroke Image Repository</li><li>Data Analysis</li></ul> | <ul style="list-style-type: none"><li>Help Index</li><li>Comments</li><li>Search this Website</li><li>Credits / Contacts</li></ul> |



NIH | CIT | NINDS | DCB | Search | Index | SiteMap | Comments

# Suburban Hospital Stroke Study

[Home](#) | [<< Back](#) | [Administration](#) | [Archive](#) | [Resources](#)



## NIH Medical Image Archive System

National Institute of Neurological Disorders and Stroke



**Archive**

- Suburban Study
  - Clinical Pages
  - Image & Data Query
- GAIN Study
- Stroke Image Repository
- Data Analysis

### Suburban Hospital Study

#### Clinical Pages

- **Patient and Clinical Data**
  - **Admission**
    - [Admission Information](#)
    - [Edit Admission Information](#)
    - [View Admission Information](#)
  - **Daily Followup**
    - [Daily Followup Information](#)
    - [Edit Daily Followup Information](#)
    - [View Daily Followup Information](#)
  - [Record Locking/Unlocking](#)
  - [Demographic Data Search](#)



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# Admission Forms (Cont.)

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|  |   |  |  |                                      |  |  |
|--|---|--|--|--------------------------------------|--|--|
| <b>Last Name:</b>  | <input type="text"/>  | <b>ACUTE Cerebrovascular Event?</b><br><a href="#">Clear Selection</a> | <input type="radio"/> Yes <input type="radio"/> No | <b>CONTEXT:</b>                      | <b>ADMIT</b>   | <b>Triage Date</b><br><input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy) |
| <b>First Name:</b>   | <input type="text"/>  |  |  | <b>Date of Onset:</b>                | <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy) | <b>Triage Time:</b><br><input type="text"/> : <input type="text"/> (HH:MM)                               |
| <b>Medical Record#:</b>  | <input type="text"/>  |  |  | <b>Date Last Seen:</b>               | <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy) | <b>Woke with Symptoms?</b><br><a href="#">Clear Selection</a>  |
| <b>Ethnic Origin:</b><br><a href="#">Clear Selection</a>                         | <input type="radio"/> White   | <input type="radio"/> Black or African-American                        |  | <b>Time Last Seen Normal:</b>        | <input type="text"/> : <input type="text"/><br>(HH:MM)                             | <b>Symptoms Progression</b><br><a href="#">Clear Selection</a>   |
|  | <input type="radio"/> Asian   | <input type="radio"/> Native Hawaiian or Other Pacific Islander        |  |                                      | <input type="radio"/> Abrupt   |  |
|  | <input type="radio"/> American-Indian or Alaskan Native   | <input type="radio"/> Unknown  |  | <b>Time First Seen with Symptoms</b> | <input type="text"/> : <input type="text"/><br>(HH:MM)                             | <input type="radio"/> Fluctuating  |
|  | <b>Hispanic Origin?</b><br><a href="#">Clear Selection</a>  |  |  |                                      | <input type="radio"/> Rapid Improvement  |  |
| <input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unknown |   |  |  |                                      |  | <input type="radio"/> Unknown  |
| <b>Date of Birth:</b>  | <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy)  |  |  | <b>Natural History Consent Date:</b> | <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy) | <b>Natural History Consent:</b><br><a href="#">Clear Selection</a>                                       |
| <b>Age:</b>  | <input type="text"/> Yrs  |  |  | <b>Natural History Consent Time:</b> | <input type="text"/> : <input type="text"/><br>(HH:MM)                             | <input type="radio"/> Self   |
| <b>Sex:</b><br><a href="#">Clear Selection</a>                                   | <input type="radio"/> Female <input type="radio"/> Male   |  |  |                                      | <input type="radio"/> Surrogate  |  |
| <b>Contact Telephone:</b>  | <input type="text"/>  |  |  | <b>Private Neurologist:</b>          | <input type="text"/>   | <input type="radio"/> Waived   |
| <b>Mode of Transfer:</b><br><a href="#">Clear Selection</a>                      | <input type="radio"/> Fire/Rescue <input type="radio"/> Inpatient<br><input type="radio"/> Personal Auto <input type="radio"/> Helicopter   |  |  | <b>Date of Admission :</b>           | <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy) | <input type="radio"/> Not Obtained   |
| <b>Paging Time:</b>  | <input type="text"/> : <input type="text"/><br>(HH:MM)  |  |  | <b>Primary MD:</b>                   | <input type="text"/>   | <input type="radio"/> Refused  |
| <b>Stroke Team Arrival Time:</b>   | <input type="text"/> : <input type="text"/><br>(HH:MM)  |  |  |                                      |  | <input type="radio"/> Verbal   |
| <b>Page Priority:</b><br><a href="#">Clear Selection</a>                         | <input type="radio"/> 43-1 <input type="radio"/> 43-2   |  |  |                                      |  | <b>Contacted?</b><br><a href="#">Clear Selection</a>   |
| <b>Page Answered by:</b>   | <input type="checkbox"/> Baird <input type="checkbox"/> Chalela <input type="checkbox"/> Davis<br><input type="checkbox"/> Ezzeddine <input type="checkbox"/> Haymore<br><input type="checkbox"/> Nyquist <input type="checkbox"/> Warach |  |  |                                      |  | <input type="radio"/> Yes <input type="radio"/> No   |
|  |   |  |  | <b>Comments:</b>                     | <input type="text"/>   |  |

|                                 |                         |   |                                 |                                    |   |                      |
|---------------------------------|-------------------------|---|---------------------------------|------------------------------------|---|----------------------|
| <a href="#">Clear Selection</a> | <b>Chief Complaints</b> | <a href="#">Check All No</a>  | <a href="#">Clear Selection</a> | <b>Risk Factors</b>                | <a href="#">Check All No</a>  | <b>Comments</b>      |
| <input type="radio"/>           | Altered LOC             | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Hypertension                       | <input type="radio"/> Yes <input type="radio"/> No                                  | <input type="text"/> |
| <input type="radio"/>           | Confusion               | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Diabetes                           | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Abnormal Speech         | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | CAD                                | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Unilateral Weakness     | <input type="radio"/> Left <input type="radio"/> Right <input type="radio"/> No | <input type="radio"/>           | AFib                               | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Diffuse Weakness        | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Smoker                             | <input type="radio"/> Current <input type="radio"/> Former <input type="radio"/> No |                      |
| <input type="radio"/>           | Difficulty Walking      | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Overweight/obese                   | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Visual Abnormalities    | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Sickle Cell Disease                | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Nausea/Vomiting         | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Etoh                               | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Headache                | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Hyperlipidemia                     | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Dizziness               | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Illicit Drugs                      | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Loss of Coordination    | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Prosthetic Heart Valve             | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Sensory Changes         | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Valvular Heart Disease             | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Seizure at Onset        | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | Previous Stroke                    | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <b>Comments</b>                 |                         |   | <input type="radio"/>           | TIA                                | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="text"/>            |                         |   | <input type="radio"/>           | PE/DVT                             | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
|                                 |                         |   | <input type="radio"/>           | LVH                                | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
|                                 |                         |   | <input type="radio"/>           | Cancer                             | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
|                                 |                         |   | <input type="radio"/>           | Carotid Disease                    | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
|                                 |                         |   | <input type="radio"/>           | PVD                                | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
|                                 |                         |   | <input type="radio"/>           | Infection within 1 wk of Admission | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
|                                 |                         |   | <input type="radio"/>           | Recent Surgery                     | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
|                                 |                         |   | <input type="radio"/>           | HRT                                | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |
| <input type="radio"/>           | Birth Control Pills     | <input type="radio"/> Yes <input type="radio"/> No                              | <input type="radio"/>           | COX 2 Inhibitors                   | <input type="radio"/> Yes <input type="radio"/> No                                  |                      |

# Admission Forms (Cont.)

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| Disposition from ER : |                                  | Studies Eligibility <a href="#">Clear Selection</a> |  |
|-----------------------|----------------------------------|---|--|
| ICU                   | <input type="radio"/>            | Natural History                                     | <input type="radio"/> Yes <input type="radio"/> No |
| ICUSD                 | <input type="radio"/>            | Reperfusion   | <input type="radio"/> Yes <input type="radio"/> No |
| Telemetry             | <input type="radio"/>            | HEME ER   | <input type="radio"/> Yes <input type="radio"/> No |
| Regular Floor         | <input type="radio"/>            | HEME 6HR  | <input type="radio"/> Yes <input type="radio"/> No |
| Stroke Unit           | <input checked="" type="radio"/> | Angioplasty CCAS                                    | <input type="radio"/> Yes <input type="radio"/> No |
| Home                  | <input type="radio"/>            | Rosie   | <input type="radio"/> Yes <input type="radio"/> No |

| CT  |  | MRI  |  |
|---|--|--|--|
| CT Done <a href="#">Clear Selection</a>   | <input type="radio"/> Yes <input type="radio"/> No | MRI Done <a href="#">Clear Selection</a>   | <input type="radio"/> Yes <input type="radio"/> No   |
| Admit CT Start Time: <input type="text"/> : <input type="text"/> (HH:MM)                            |  | Admit MRI Start Time (Stamp on Scout Localizer): <input type="text"/> : <input type="text"/> (HH:MM) | <input type="checkbox"/> Scanner Not Available<br><input type="checkbox"/> Unstable Medical Condition<br><input type="checkbox"/> Pt Restrm<br><input type="checkbox"/> Poor IV Access<br><input type="checkbox"/> Unknown History/Awaiting Family |
| Admit MRI Finish Time (Stamp on Last Sequence): <input type="text"/> : <input type="text"/> (HH:MM) |  |  |  |

| Admission Meds <a href="#">Clear Selection</a> <a href="#">Check All No</a>                 | Admission Diagnosis                         |
|---|---|
| ACEI <input type="radio"/> Yes <input type="radio"/> No                                     | Ischemic Stroke <input type="checkbox"/>    |
| Ca Channel BI <input type="radio"/> Yes <input type="radio"/> No                            | TIA <input type="checkbox"/>                |
| Beta blockers <input type="radio"/> Yes <input type="radio"/> No                            | Primary ICH <input type="checkbox"/>        |
| Alpha blockers <input type="radio"/> Yes <input type="radio"/> No                           | SAH <input type="checkbox"/>                |
| Diuretics <input type="radio"/> Yes <input type="radio"/> No                                | AVM <input type="checkbox"/>                |
| Oral antiDM <input type="radio"/> Yes <input type="radio"/> No                              | Other DX <input type="checkbox"/>           |
| Insulin <input type="radio"/> Yes <input type="radio"/> No                                  | Primary CV <input type="checkbox"/>         |
| Nitrates <input type="radio"/> Yes <input type="radio"/> No                                 | Subdural <input type="checkbox"/>           |
| Statins <input type="radio"/> Yes <input type="radio"/> No                                  | Traumatic Epidural <input type="checkbox"/> |
| ASA 81 <input type="radio"/> Yes <input type="radio"/> No                                   |   |
| ASA 325 <input type="radio"/> Yes <input type="radio"/> No                                  |   |
| Aggrenox <input type="radio"/> Yes <input type="radio"/> No                                 |   |
| Plavix <input type="radio"/> Yes <input type="radio"/> No                                   |   |
| Ticlid <input type="radio"/> Yes <input type="radio"/> No                                   |   |
| Coumadin <input type="radio"/> Yes <input type="radio"/> No                                 |   |
| Vitamins <input type="radio"/> Yes <input type="radio"/> No                                 |   |
| No Medications <input type="radio"/> Yes <input type="radio"/> No                           |   |
| Any Change in medication prior to event? <input type="radio"/> Yes <input type="radio"/> No |   |

| NIH Stroke Scale <a href="#">help</a>  |  |   |
|--|--|---|
| Context  | Admit  | 2 Hour  |
| Done   | <input type="radio"/> Yes <input checked="" type="radio"/> No                          | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Stroke Side  | <input type="radio"/> Left <input type="radio"/> Right <input type="radio"/> Bilateral |   |
| Symptoms   |  |   |
| NIHSS time   | <input type="text"/> : <input type="text"/> (HH:MM)                                    | <input type="text"/> : <input type="text"/> (HH:MM)           |
| 1a LOC   | <input type="text"/>   | <input type="text"/>  |
| 1b LOC Questions   | <input type="text"/>   | <input type="text"/>  |
| 1c LOC commands  | <input type="text"/>   | <input type="text"/>  |
| 2 Best gaze  | <input type="text"/>   | <input type="text"/>  |
| 3 Visual   | <input type="text"/>   | <input type="text"/>  |
| 4 Facial   | <input type="text"/>   | <input type="text"/>  |
| 5a L arm   | <input type="text"/>   | <input type="text"/>  |
| 5b R arm   | <input type="text"/>   | <input type="text"/>  |
| 6a L Leg   | <input type="text"/>   | <input type="text"/>  |
| 6b R Leg   | <input type="text"/>   | <input type="text"/>  |
| 7 Limb ataxia  | <input type="text"/>   | <input type="text"/>  |
| 8 Sensory  | <input type="text"/>   | <input type="text"/>  |
| 9 Language   | <input type="text"/>   | <input type="text"/>  |
| 10 Dysarthria  | <input type="text"/>   | <input type="text"/>  |
| 11 Neglect   | <input type="text"/>   | <input type="text"/>  |
| NIHSS Total <a href="#">Show Total</a>   | <input type="text"/> Auto Fill   | <input type="text"/> Auto Fill                                |
| [The NIHSS Values are automatically filled if you type in the Total as 40 or 0 and press " Auto Fill ".] |  |   |

| Barthel Scale <a href="#">help</a>  |   |
|---|---|
| Context   | PRE- Admit  |
| Done  | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Bathing (0,5)   | <input type="text"/>  |
| Stairs (0,5,10)   | <input type="text"/>  |
| Dressing (0,5,10)   | <input type="text"/>  |
| Walking (0,5,10,15)   | <input type="text"/>  |
| Transfer (bed to chair) (0,5,10,15)   | <input type="text"/>  |
| Feeding (0,5,10)  | <input type="text"/>  |
| Toilet Use (0,5,10)   | <input type="text"/>  |
| Grooming (0,5)  | <input type="text"/>  |
| Bladder (0,5,10)  | <input type="text"/>  |
| Bowel (0,5,10)  | <input type="text"/>  |
| Barthel Total <a href="#">Show Total</a>  | <input type="text"/> Auto Fill                                |
| [The Barthel Values are automatically filled if you type in the Total as 100 or 0 and press " Auto Fill ".] |   |

| Rankin <a href="#">help</a> |   |
|-----------------------------|---|
| Context                     | PRE-Admit   |
| Done                        | <input type="radio"/> Yes <input checked="" type="radio"/> No |
| Score                       | <input type="text"/>  |

| Oxfordshire <a href="#">Clear Selection</a> |                            |
|---|----------------------------|
| Context                                     | Admit                      |
| <input type="radio"/> TACI                  | <input type="radio"/> PACI |
| <input type="radio"/> LACI                  | <input type="radio"/> POCI |

| Past Medical History Comments |
|-------------------------------|
| <div></div>                   |

# Admission Forms

Page 3 of 3

| Thrombolysis  |   |
|---|---|
| <input checked="" type="checkbox"/> None                                      | If None, why?   |
|   | Time <input type="radio"/> Yes <input checked="" type="radio"/> No            |
|   | Patient Refused <input type="radio"/> Yes <input checked="" type="radio"/> No |
|   | Severity <input type="radio"/> Yes <input checked="" type="radio"/> No        |
| Bleeding Risk <input type="radio"/> Yes <input checked="" type="radio"/> No   |   |
| IV t-PA <input type="radio"/> Yes <input checked="" type="radio"/> No         |   |
| IA Thrombolysis <input type="radio"/> Yes <input checked="" type="radio"/> No |   |
| Surgical <input type="radio"/> Yes <input checked="" type="radio"/> No        |   |

| IV t-PA   |   |
|---|---|
| Date <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy)   | Time <input type="text"/> : <input type="text"/><br>(HH:MM) |
| t-PA bolus <input type="text"/>   | Total dose <input type="text"/>                             |
| Stat Improvement? <a href="#">Clear Selection</a>   |   |
| <input type="radio"/> During Infusion<br><input type="radio"/> Up to 4 Hours After Infusion<br><input type="radio"/> Up to 24 Hours After Infusion<br><input type="radio"/> Up to 5 Days After Infusion |   |
| Delayed Improvement? <a href="#">Clear Selection</a>  |   |
| <input type="radio"/> No<br><input type="radio"/> Yes, sudden<br><input type="radio"/> Yes, over hours<br><input type="radio"/> Yes, over days  |   |

| Intra-arterial Thrombolysis   |  |
|---|--|
| Date <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy) |  |
| Time Started (procedure) <input type="text"/> : <input type="text"/><br>(HH:MM)         |  |
| t-PA Infusion <input type="radio"/> Yes <input checked="" type="radio"/> No             |  |
| Start Time <input type="text"/> : <input type="text"/><br>(HH:MM)                       |  |
| Finish Time <input type="text"/> : <input type="text"/><br>(HH:MM)                      |  |
| Total dose <input type="text"/>   |  |
| Comments  |  |
| <div style="border: 1px solid black; height: 100px; width: 100%;"></div>                |  |

| Stroke Medical Complications  |  |
|---|--|
| Date <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy)             | <a href="#">Clear Selection</a> <a href="#">Check All No</a> |
| DVT <input type="radio"/> Yes <input checked="" type="radio"/> No                                   |  |
| Pneumonia <input type="radio"/> Yes <input checked="" type="radio"/> No                             |  |
| UTI <input type="radio"/> Yes <input checked="" type="radio"/> No                                   |  |
| Clinical Deterioration <input type="radio"/> Yes <input checked="" type="radio"/> No                |  |
| Pulmonary Embolus <input type="radio"/> Yes <input checked="" type="radio"/> No                     |  |
| Seizures <input type="radio"/> Yes <input checked="" type="radio"/> No                              |  |
| Recurrent Stroke <input type="radio"/> Yes <input checked="" type="radio"/> No                      |  |
| Hemorrhagic Transform <input type="radio"/> Yes <input checked="" type="radio"/> No                 |  |
| Herniation <input type="radio"/> Yes <input checked="" type="radio"/> No                            |  |
| Hemorrhagic due to anticoagulation <input type="radio"/> Yes <input checked="" type="radio"/> No    |  |
| Death? <input type="radio"/> Yes <input checked="" type="radio"/> No                                |  |
| Support Withdrawn? <input type="radio"/> Yes <input checked="" type="radio"/> No                    |  |
| Immediate Cause of Death? <input type="radio"/> Neurological <input type="radio"/> Non-Neurological |  |
| <a href="#">Clear Selection</a>   |  |

| Stroke Location   |                          |
|-------------------|--------------------------|
| Frontal Lobe      | <input type="checkbox"/> |
| Parietal Lobe     | <input type="checkbox"/> |
| Temporal Lobe     | <input type="checkbox"/> |
| Occipital Lobe    | <input type="checkbox"/> |
| Caudate           | <input type="checkbox"/> |
| Putamen           | <input type="checkbox"/> |
| Internal Capsule  | <input type="checkbox"/> |
| Globus Pallidus   | <input type="checkbox"/> |
| Centrum Semiovale | <input type="checkbox"/> |
| Thalamus          | <input type="checkbox"/> |
| Midbrain          | <input type="checkbox"/> |
| Pons              | <input type="checkbox"/> |
| Medulla           | <input type="checkbox"/> |
| Cerebellum        | <input type="checkbox"/> |
| Unknown           | <input type="checkbox"/> |

| Vascular Territory |                          |
|--------------------|--------------------------|
| R ACA              | <input type="checkbox"/> |
| L ACA              | <input type="checkbox"/> |
| R MCA              | <input type="checkbox"/> |
| L MCA              | <input type="checkbox"/> |
| R Lenticulostriate | <input type="checkbox"/> |
| L Lenticulostriate | <input type="checkbox"/> |
| R Ant Choroidal    | <input type="checkbox"/> |
| L Ant Choroidal    | <input type="checkbox"/> |
| R PCA              | <input type="checkbox"/> |
| L PCA              | <input type="checkbox"/> |
| R Vertebral        | <input type="checkbox"/> |
| L Vertebral        | <input type="checkbox"/> |
| R MCA Watershed    | <input type="checkbox"/> |
| L MCA Watershed    | <input type="checkbox"/> |
| Basilar            | <input type="checkbox"/> |
| Unknown            | <input type="checkbox"/> |

| Basis of Diagnosis              |                       |
|---------------------------------|-----------------------|
| <a href="#">Clear Selection</a> |                       |
| Imaging Confirmed               | <input type="radio"/> |
| Clinical Impression             | <input type="radio"/> |

| Basis of Diagnosis              |                       |
|---------------------------------|-----------------------|
| <a href="#">Clear Selection</a> |                       |
| Imaging Confirmed               | <input type="radio"/> |
| Clinical Impression             | <input type="radio"/> |

| Thrombolytic Complications? <a href="#">Clear Selection</a>                                 |  |
|---|--|
| <input type="radio"/> Yes <input checked="" type="radio"/> No                               |  |
| Date <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy)     |  |
| Time <input type="text"/> : <input type="text"/><br>(HH:MM)                                 |  |
| Occurred During RX? <input type="radio"/> Yes <input checked="" type="radio"/> No           |  |
| Immediately After? <input type="radio"/> Yes <input checked="" type="radio"/> No            |  |
| Symptomatic Brain Hemorrhage <input type="radio"/> Yes <input checked="" type="radio"/> No  |  |
| Asymptomatic Brain Hemorrhage <input type="radio"/> Yes <input checked="" type="radio"/> No |  |
| Systemic Hemorrhage <input type="radio"/> Yes <input checked="" type="radio"/> No           |  |
| SAH <input type="radio"/> Yes <input checked="" type="radio"/> No                           |  |
| Puncture Site <input type="radio"/> Yes <input checked="" type="radio"/> No                 |  |
| Other <input type="radio"/> Yes <input checked="" type="radio"/> No                         |  |

| Pre-admit Neuroimaging Log  |                              |
|---|------------------------------|
| Date <input type="text"/> / <input type="text"/> / <input type="text"/><br>(mm/dd/yyyy) |                              |
| Study Type  |                              |
| CT  | <input type="checkbox"/> Yes |
| MRI Head  | <input type="checkbox"/> Yes |
| MRI Neck  | <input type="checkbox"/> Yes |
| MRI Arch  | <input type="checkbox"/> Yes |
| MRI Heart   | <input type="checkbox"/> Yes |

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Suburban Stroke Database Data Collection Sheet - Page 1 of 3

Show Patient Info

|                                       |  |                                |  |                               |  |
|---------------------------------------|--|--------------------------------|--|-------------------------------|--|
| ACUTE Cerebrovascular Event? Yes      |  | CONTEXT:                       |  | ADMIT                         |  |
| Last Name:                            |  | Date of Admission:             |  | 06/27/2002                    |  |
| First Name:                           |  | Triage Date:                   |  | 06/26/2002                    |  |
| Medical Record#:                      |  | Triage Time:                   |  | 20:46                         |  |
| Ethnic Origin:                        |  | Date of Onset:                 |  | 06/22/2002                    |  |
| Hispanic Origin? No                   |  | Date Last Seen:                |  | 06/22/2002                    |  |
| Age:                                  |  | Time Last Seen Normal:         |  | 12:12                         |  |
| Sex: F                                |  | Time First Seen with Symptoms: |  |                               |  |
| Contact Telephone:                    |  | Woke with Symptoms?            |  | No                            |  |
| 301-545-0846                          |  | Symptoms Progression:          |  | Fluctuating                   |  |
| Mode of Transfer:                     |  | Personal Auto                  |  | Not Obtained                  |  |
| Paging Time:                          |  | 21:44                          |  | Natural History Consent:      |  |
| Stroke Team Arrival Time:             |  | 22:00                          |  | Natural History Consent Date: |  |
| Page Priority:                        |  | 43-2                           |  | Natural History Consent Time: |  |
| Page Answered by:                     |  | Barid,Maymore                  |  |                               |  |
| Private Neurologist:                  |  |                                |  |                               |  |
| Primary ND:                           |  | Nimetz                         |  |                               |  |
| Primary ND Contacted?                 |  | Yes                            |  |                               |  |
| Comments:                             |  |                                |  |                               |  |
| PMD contacted via fax.                |  |                                |  |                               |  |
| Chief Complaints                      |  |                                |  |                               |  |
| Altered LOC No                        |  |                                |  |                               |  |
| Confusion No                          |  |                                |  |                               |  |
| Abnormal Speech Yes                   |  |                                |  |                               |  |
| Unilateral Weakness No                |  |                                |  |                               |  |
| Diffuse Weakness Yes                  |  |                                |  |                               |  |
| Difficulty Walking No                 |  |                                |  |                               |  |
| Visual Abnormalities No               |  |                                |  |                               |  |
| Nausea/Vomiting No                    |  |                                |  |                               |  |
| Headache No                           |  |                                |  |                               |  |
| Dizziness No                          |  |                                |  |                               |  |
| Loss of Coordination No               |  |                                |  |                               |  |
| Sensory Changes No                    |  |                                |  |                               |  |
| Seizure at Onset No                   |  |                                |  |                               |  |
| Comments                              |  |                                |  |                               |  |
| Risk Factors                          |  |                                |  |                               |  |
| Hypertension Yes                      |  |                                |  |                               |  |
| Diabetes Yes                          |  |                                |  |                               |  |
| CAD No                                |  |                                |  |                               |  |
| AFib Yes                              |  |                                |  |                               |  |
| Smoker No                             |  |                                |  |                               |  |
| Overweight/obese No                   |  |                                |  |                               |  |
| Sickle Cell Disease No                |  |                                |  |                               |  |
| Etoh No                               |  |                                |  |                               |  |
| Hyperlipidemia Yes                    |  |                                |  |                               |  |
| Illicit Drugs No                      |  |                                |  |                               |  |
| Prosthetic Heart Valve No             |  |                                |  |                               |  |
| Valvular Heart Disease No             |  |                                |  |                               |  |
| Previous Stroke No                    |  |                                |  |                               |  |
| TIA No                                |  |                                |  |                               |  |
| PE/DVT Yes                            |  |                                |  |                               |  |
| LVH No                                |  |                                |  |                               |  |
| Cancer No                             |  |                                |  |                               |  |
| Carotid Disease No                    |  |                                |  |                               |  |
| PVD No                                |  |                                |  |                               |  |
| Infection within 1 wk of Admission No |  |                                |  |                               |  |
| Recent Surgery No                     |  |                                |  |                               |  |
| HRT No                                |  |                                |  |                               |  |
| Birth Control Pills No                |  |                                |  |                               |  |
| CDX 2 Inhibitors No                   |  |                                |  |                               |  |
| Comments                              |  |                                |  |                               |  |

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Show Patient Info

|  |  |                       |  |                             |  |
|--|--|-----------------------|--|-----------------------------|--|
| Disposition Eligibility                  |  | CT Done               |  | Yes                         |  |
| ICU                                      |  | Admit CT Start Time:  |  | 22:06                       |  |
| ICUSD                                    |  | MRI Done              |  | No                          |  |
| Telemetry                                |  | Admit MRI Start Time  |  | (Stamp on Scout Localizer): |  |
| Regular Floor                            |  | Admit MRI Finish Time |  | (Stamp on Last Sequence):   |  |
| Stroke Unit                              |  | MRI Delay Cause       |  |                             |  |
| Home                                     |  |                       |  |                             |  |
| Natural History                          |  | No                    |  |                             |  |
| Reperfusion                              |  | No                    |  |                             |  |
| HEME ER                                  |  | No                    |  |                             |  |
| HEME GHR                                 |  | No                    |  |                             |  |
| Angioplasty CCAS                         |  | No                    |  |                             |  |
| Rosie                                    |  | No                    |  |                             |  |
| Admission Meds                           |  | Admission Diagnosis   |  | Stroke Location             |  |
| ACEI                                     |  | Yes                   |  | Ischemic Stroke             |  |
| Ca Channel BI                            |  | No                    |  | TIA                         |  |
| Beta blockers                            |  | Yes                   |  | Primary ICH                 |  |
| Diuretics                                |  | Yes                   |  | SAH                         |  |
| Oral antiIDM                             |  | Yes                   |  | AVM                         |  |
| Insulin                                  |  | No                    |  | Other DX                    |  |
| Nitrate                                  |  | No                    |  | Primary CV                  |  |
| Statins                                  |  | No                    |  | Subdural                    |  |
| ASA 95                                   |  | No                    |  | Traumatic Epidural          |  |
| ASA 325                                  |  | No                    |  |                             |  |
| Aggrenox                                 |  | No                    |  |                             |  |
| Plavix                                   |  | No                    |  |                             |  |
| Tidid                                    |  | No                    |  |                             |  |
| Coumadin                                 |  | No                    |  |                             |  |
| Vitamins                                 |  | No                    |  |                             |  |
| No Medications                           |  | No                    |  |                             |  |
| Any Change in medication prior to event? |  | No                    |  |                             |  |
| ICM Location                             |  | No                    |  |                             |  |
| Lebar                                    |  | No                    |  |                             |  |
| Putamen                                  |  | No                    |  |                             |  |
| Thalamus                                 |  | No                    |  |                             |  |
| Pons                                     |  | No                    |  |                             |  |
| Cerebellar                               |  | No                    |  |                             |  |
| Vascular Territory                       |  | Stroke Side           |  | Barthel Scale               |  |
| R ACA                                    |  | -                     |  | Context                     |  |
| L ACA                                    |  | -                     |  | PRE-Admit                   |  |
| R MCA                                    |  | -                     |  | Admit                       |  |
| L MCA                                    |  | -                     |  | Yes                         |  |
| R Lenticulostriate                       |  | -                     |  | Done                        |  |
| L Lenticulostriate                       |  | -                     |  | Bathing (0,5)               |  |
| R Ant Chorioidal                         |  | -                     |  | Stairs (0,5,10)             |  |
| L Ant Chorioidal                         |  | -                     |  | Dressing (0,5,10)           |  |
| R PCA                                    |  | -                     |  | Walking (0,5,10,15)         |  |
| L PCA                                    |  | -                     |  | 2 Best gaze                 |  |
| R Vertebro                               |  | -                     |  | 3 Visual                    |  |
| L Vertebro                               |  | -                     |  | 4 Facial                    |  |
| R MCA Watershed                          |  | -                     |  | 5a L arm                    |  |
| L MCA Watershed                          |  | -                     |  | 5b R arm                    |  |
| Basilar                                  |  | -                     |  | 6a L Leg                    |  |
| Unknown                                  |  | -                     |  | 6b R Leg                    |  |
| Basis of Diagnosis                       |  | 7 Limb ataxia         |  | 1 x                         |  |
| -  |  | 8 Sensory             |  | 2 2                         |  |
| -  |  | 9 Language            |  | 3 3                         |  |
| -  |  | 10 Dysarthria         |  | 2 2                         |  |
| -  |  | 11 Neglect            |  | 1 2                         |  |
| -  |  | NIHSS Total           |  | 40 40                       |  |
| Oxfordshire                              |  | Context               |  | Admit                       |  |
| -  |  | Done                  |  | 3                           |  |
| Past Medical History Comments            |  | -                     |  | -                           |  |

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Suburban Stroke Database Data Collection Sheet - Page 3 of 3

Show Patient Info

Last Name: First Name: Medical Record#:


|                             |   |                                    |            |
|-----------------------------|---|------------------------------------|------------|
| IV t-PA                     |   | Thrombolysis                       |            |
| Date                        | - | Time                               | -          |
| t-PA bolus                  | - | Total dose                         | -          |
| Stat Improvement?           |   | If None, why?                      |            |
| -                           |   | Patient Refused                    |            |
| Delayed Improvement?        |   | Severity                           |            |
| -                           |   | Bleeding Risk                      |            |
| -                           |   | No                                 |            |
| IV t-PA                     |   | No                                 |            |
| IA Thrombolysis             |   | No                                 |            |
| Surgical                    |   | No                                 |            |
| Intra-arterial Thrombolysis |   | Stroke Medical Complications       |            |
| Date                        | - | Date                               | -          |
| Time Started (procedure)    | - | DVT                                | No         |
| t-PA Infusion               |   | Pneumonia                          | No         |
| IA t-PA?                    | - | UTI                                | No         |
| Start Time                  | - | Clinical Deterioration             | No         |
| Finish Time                 | - | Pulmonary Embolus                  | No         |
| Total dose                  | - | Seizures                           | No         |
| Comments                    |   | Recurrent Stroke                   | No         |
| -                           |   | Hemorrhagic Transform              | No         |
| -                           |   | Herniation                         | No         |
| -                           |   | Hemorrhagic due to anticoagulation | No         |
| -                           |   | Death?                             | No         |
| -                           |   | Support Withdrawn?                 | No         |
| -                           |   | Immediate Cause of Death?          | -          |
| Thrombolytic Complications? |   | Pre-admit Neuroimaging Log         |            |
| -                           |   | Date                               | 06/26/2002 |
| -                           |   | Study Type                         |            |
| -                           |   | CT                                 | Yes        |
| -                           |   | MRI Head                           | -          |
| -                           |   | MRI Neck                           | -          |
| -                           |   | MRI Arch                           | -          |
| -                           |   | MRI Heart                          | -          |
| -                           |   | Occurred During RX?                |            |
| -                           |   | Immediately After?                 |            |
| -                           |   | Symptomatic Brain Hemorrhage       |            |
| -                           |   | Asymptomatic Brain Hemorrhage      |            |
| -                           |   | Systemic Hemorrhage                |            |
| -                           |   | SAH                                |            |
| -                           |   | Puncture Site                      |            |
| -                           |   | Other                              |            |
| -                           |   | Rankin                             |            |
| -                           |   | Context                            |            |
| -                           |   | PRE-Admit                          |            |
| -                           |   | Done                               |            |
| -                           |   | Yes                                |            |
| -                           |   | Score                              |            |
| -                           |   | 2                                  |            |

Suburban Stroke Database Data Collection Sheet - Page 3 of 3



# Configurable Query

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### Image & Data Query

- [Build Search Criteria](#)

**Note :** Check any of the following options and press **Build Criteria** to build a search query.

|   |  |  |
|---|--|--|
| <input checked="" type="checkbox"/> Patient Information | <input checked="" type="checkbox"/> Chief Complaints             | <input type="checkbox"/> Risk Factors                          |
| <input type="checkbox"/> Studies Eligibility            | <input type="checkbox"/> Medication                              | <input checked="" type="checkbox"/> Diagnosis                  |
| <input type="checkbox"/> Stroke Location                | <input checked="" type="checkbox"/> Stroke Medical Complications | <input checked="" type="checkbox"/> Thrombolytic Complications |

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# Configurable Query Forms

**Suburban Hospital Study**

**Image & Data Query**

- Search Criteria

---

Medical Record #

Difference between Time of Onset and Time of Admission  >=  DD (Hrs)

Acute Cerebrovascular Event ☐ Yes ☐ No

Thrombolysis  None

Examination Type ☐ CT ☐ MRI Head ☐ MRI Neck ☐ MRI Arch ☐ MRI Heart

Clinical Visit Type  Pre-Admit  Admit  2 Hour  24 Hour  5 Day

---

**Patient Information** [Clear Selection](#)

Last Name

First Name

Date of Birth  Mon  Day  Year

Age

Sex ☐ Female ☐ Male

---

**Chief Complaints** [Clear Selection](#)

Altered LOC ☐ Yes ☐ No

Confusion ☐ Yes ☐ No

Abnormal Speech ☐ Yes ☐ No

Unilateral Weakness ☐ Yes ☐ No

Diffuse Weakness ☐ Yes ☐ No

Difficulty Walking ☐ Yes ☐ No

Visual Abnormalities ☐ Yes ☐ No

Nausea/ Vomiting ☐ Yes ☐ No

Headache ☐ Yes ☐ No

Dizziness ☐ Yes ☐ No

Loss of Coordination ☐ Yes ☐ No

Sensory Changes ☐ Yes ☐ No

Seizure at Onset ☐ Yes ☐ No

**Diagnosis**

Ischemic Stroke ☐

TIA ☐

Primary ICH ☐

SAH ☐

AVM ☐

Other DX ☐

Primary CV ☐

Subdural ☐

Traumatic Epidural ☐

---

**Thrombolytic Complications** [Clear Selection](#)

Occurred During RX ? ☐ Yes ☐ No

Immediately After ? ☐ Yes ☐ No

Symptomatic Brain Hemorrhage ☐ Yes ☐ No

Asymptomatic Brain Hemorrhage ☐ Yes ☐ No

Systemic Hemorrhage ☐ Yes ☐ No

SAH ☐ Yes ☐ No

Puncture Site ☐ Yes ☐ No

Other ☐ Yes ☐ No

---

**Stroke Medical Complications** [Clear Selection](#)

DVT ☐ Yes ☐ No

Pneumonia ☐ Yes ☐ No

UTI ☐ Yes ☐ No

Clinical deterioration ☐ Yes ☐ No

Pulmonary Embolus ☐ Yes ☐ No

Seizures ☐ Yes ☐ No

Recurrent Stroke ☐ Yes ☐ No

Hemorrhagic Transform ☐ Yes ☐ No

Herniation ☐ Yes ☐ No


Death ? ☐ Yes ☐ No

Support Withdrawn ☐ Yes ☐ No

Immediate Cause of Death ? ☐ Neurological ☐ Non-Neurological

# Query Output Results

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## NIH Medical Image Archive System

### Image & Data Query

- Search Results

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 1) Click on any of the following links to download a  
 2) or check on any of the following boxes to downlo  
 format.  
 3) Press the **Download** button to download the sele  
 4) To access location of the image related to the m  
 permission on local computer.

| Download                            | Medical Record #      | Site # | Patient Initials | Age |
|-------------------------------------|-----------------------|--------|------------------|-----|
| <input type="checkbox"/>            | 10080                 | 51871  | LW               | 82  |
| <input checked="" type="checkbox"/> | <a href="#">10289</a> | 53032  | KB               | 70  |
| <input checked="" type="checkbox"/> | <a href="#">1059</a>  | 51196  | KT               | 82  |
| <input checked="" type="checkbox"/> | <a href="#">1660</a>  | 43496  | JD               | 71  |
| <input checked="" type="checkbox"/> | <a href="#">3985</a>  | 6112   | TFM              | 78  |
| <input checked="" type="checkbox"/> | <a href="#">5946</a>  | 52464  | MK               | 72  |
| <input checked="" type="checkbox"/> | <a href="#">725</a>   | 43779  | SE               | 90  |
| <input checked="" type="checkbox"/> | <a href="#">725</a>   | 43779  | SE               | 90  |
| <input checked="" type="checkbox"/> | <a href="#">7645</a>  | 52195  | WP               | 72  |

H:\7645\7645-2

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| Name                 | Modified          | Size     | Type        |
|----------------------|-------------------|----------|-------------|
| raw data             | 1/10/2001 2:54 PM |          | File Folder |
| 7645-2-dwi-b0-ml.img | 1/10/2001 2:53 PM | 2,305 KB | IMG File    |
| 7645-2-dwi-b0-ml.oly | 1/10/2001 2:53 PM | 11 KB    | OLY File    |
| 7645-2-dwi-b0-sw.oly | 1/10/2001 2:53 PM | 11 KB    | OLY File    |
| 7645-2-dwi-ml.img    | 1/10/2001 2:53 PM | 4,609 KB | IMG File    |
| 7645-2-dwi-ml.oly    | 1/10/2001 2:53 PM | 6 KB     | OLY File    |
| 7645-2-flair.img     | 1/10/2001 2:53 PM | 577 KB   | IMG File    |
| 7645-2-flair.oly     | 1/10/2001 2:53 PM | 6 KB     | OLY File    |
| 7645-2-scout.img     | 1/10/2001 2:54 PM | 1,281 KB | IMG File    |
| 7645-2-scout.oly     | 1/10/2001 2:54 PM | 6 KB     | OLY File    |

Type: IMG File Size: 2.25 MB 2.25 MB Local intranet

|    |   | 2/26/1999 90 Day |    | In Hospital |  | 11/4/1998 90 Day |  |
|----|---|------------------|----|-------------|--|------------------|--|
| 7  | 4 | 45               | -1 | 62698.54    |  |                  |  |
| 13 | 1 | 20               |    |             |  |                  |  |
| 11 | 4 | 50               | -1 | 71121.09    |  |                  |  |

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NIH | CIT | NINDS | DCB

# Query Result Download

|    | A              | B      | C       | D   | E   | F          | G              | H           | I            | J             | K         | L        | M            |
|----|----------------|--------|---------|-----|-----|------------|----------------|-------------|--------------|---------------|-----------|----------|--------------|
| 1  | Medical Record | Site # | Patient | Age | Sex | Exam Date  | Clinical Visit | NIHSS Total | Rankin Score | Barthel Total | DWI b1000 | MTT      | DWI b0/Flair |
| 2  | 725            | 43779  | SE      | 90  | M   | 11/25/1998 | Admit          | 24          |              |               | 51907.32  | 101267.6 |              |
| 3  | 725            | 43779  | SE      | 90  | M   | 2/26/1999  | Discharge      | 7           | 4            | 45            |           | -1       | 62698.54     |
| 4  | 725            | 43779  | SE      | 90  | M   |            | 30 Day         | 13          | 1            | 20            |           |          |              |
| 5  | 1059           | 51196  | KT      | 82  | M   | 2/7/1999   | Admit          | 13          |              |               | 34859.18  | 212200.5 |              |
| 6  | 1059           | 51196  | KT      | 82  | M   | 5/12/1999  | Discharge      | 6           | 5            | 50            |           | -1       | 54937.41     |
| 7  | 1059           | 51196  | KT      | 82  | M   |            | 30 Day         | 9           | 0            | 15            |           |          |              |
| 8  | 1660           | 43496  | JD      | 71  | M   | 3/16/1999  | Admit          | 20          |              |               | 68155.66  | 285548.7 |              |
| 9  | 1660           | 43496  | JD      | 71  | M   | 6/16/1999  | Discharge      | 14          | 4            | 50            |           | -1       | 90689.58     |
| 10 | 1660           | 43496  | JD      | 71  | M   |            | 30 Day         | 13          | 0            | 30            |           |          |              |
| 11 | 3985           | 6112   | TFM     | 78  | M   | 1/4/1999   | Discharge      | 14          | 5            | 15            |           | -1       | 147643.27    |
| 12 | 3985           | 6112   | TFM     | 78  | M   |            | 30 Day         | 22          | 0            | 0             |           |          |              |
| 13 | 3985           | 6112   | TFM     | 78  | M   | 12/25/1998 | Admit          | 25          |              |               | 53383.89  | -1       |              |
| 14 | 5946           | 52464  | MK      | 72  | M   | 3/31/1999  | Admit          | 22          |              |               | 268297.56 | 218445.1 |              |
| 15 | 5946           | 52464  | MK      | 72  | M   | 9/22/1999  | Discharge      | 20          | 5            | 25            |           | -1       | 357426.56    |
| 16 | 5946           | 52464  | MK      | 72  | M   |            | 30 Day         | 28          | 1            | 0             |           |          |              |
| 17 | 7645           | 52195  | WP      | 72  | M   | 8/7/1998   | Admit          | 14          |              |               | 59234.77  | 248973.1 |              |
| 18 | 7645           | 52195  | WP      | 72  | M   | 11/4/1998  | Discharge      | 11          | 4            | 50            |           | -1       | 71121.09     |
| 19 | 7645           | 52195  | WP      | 72  | M   |            | 30 Day         | 12          | 0            | 25            |           |          |              |
| 20 | 10080          | 51871  | LW      | 82  | M   | 7/15/1999  | Discharge      | 17          | 5            | 0             |           | -1       | 402510.94    |
| 21 | 10080          | 51871  | LW      | 82  | M   |            | 30 Day         | 17          | 1            | 5             |           |          |              |
| 22 | 10080          | 51871  | LW      | 82  | M   | 4/13/1999  | Admit          | 22          |              |               | 366439.75 | 339295.6 |              |
| 23 | 10289          | 53032  | KB      | 70  | M   | 4/14/1999  | Admit          | 14          |              |               | 4792.68   | 0        |              |
| 24 | 10289          | 53032  | KB      | 70  | M   | 7/9/1999   | Discharge      | 8           | 4            | 50            |           | -1       | 5241.8       |
| 25 | 10289          | 53032  | KB      | 70  | M   |            | 30 Day         | 9           | 0            | 50            |           |          |              |



# Search across Suburban/GAIN

**NIH Medical Image Archive System**  
National Institute of Neurological Disorders and Stroke

Archive

- Suburban Study
  - Clinical Pages
  - Image & Data Query
- GAIN Study
- Stroke Image Repository
- Data Analysis


**Stroke Image Repository**  
- Search Criteria

- Study (select one or more)
  - ☒ GAIN ☒ Suburban
- Patient Information
  - Age  >=
  - Sex ☐ M ☐ F
- Clinical Scales
  - NIHSS Total  5 to  26
  - Rankin Score  0 to  3
  - Barthel Total  25 to  100
- Volumes
  - DWI B1000  to
  - MTT  to
  - DWI BQ/FLAIR  to
- Treatment
  - TPA as treatment? ☒ Y ☐ N
  - GAIN treatment? (will return GAIN data only) ☐ Y ☐ N
- Miscellaneous
  - Onset Time Calculation  >=  HH

SearchReset

# Suburban/GAIN Search Results

Home << Back Administration Archive Resources




## NIH Medical Image Archive System

National Institute of Neurological Disorders and Stroke

### Stroke Image Repository

- Search Results



**Note : Accept the security warning alert for file access permission on local computer.**

1) Click on any of the following links to download a **single** patient's record that includes Patient Info and Clinical Info in tab delimited format;  
 2) or check on any of the following boxes to download **multiple** patients' records that includes Patient Info and Clinical Info in tab delimited format.  
 3) Press the **Download** button to download the selected items.  
 4) To access location of the image(s) related to the medical record, choose the drive letter where the images are located on your local computer from the drive list and click the medical record hotlink.

**Records : 8**

Image(s) Location Drive on your local computer: F:

| Download<br><a href="#">Select All</a> | Study    | Medical<br>Record #     | Context   | Demographics |     | Clinical Scales |                 |                  | Volumes      |     |              |
|--|----------|-------------------------|-----------|--------------|-----|-----------------|-----------------|------------------|--------------|-----|--------------|
|  |          |                         |           | Age          | Sex | NIHSS<br>Total  | Rankin<br>Score | Barthel<br>Total | DWI<br>b1000 | MTT | DWI b0/Flair |
| <input type="checkbox"/>               | Suburban | <a href="#">1032828</a> | 30 Day    | 66           | F   | 6               | 2               | 75               |              |     |              |
| <input type="checkbox"/>               | Suburban | <a href="#">1549992</a> | 90 Day    | 79           | F   | 9               | 3               | 60               |              |     |              |
| <input type="checkbox"/>               | Suburban | <a href="#">1560147</a> | Discharge | 69           | F   | 5               | 2               | 65               |              |     |              |
| <input type="checkbox"/>               | Suburban | <a href="#">1590901</a> | Discharge | 73           | F   | 8               | 3               | 40               |              |     |              |
| <input type="checkbox"/>               | GAIN     | <a href="#">3635</a>    | 90 Day    |              | M   | 5               | 3               | 75               | 13467.48     | -1  | 13467.48     |
| <input type="checkbox"/>               | GAIN     | <a href="#">3650</a>    | 90 Day    |              | F   | 14              | 3               | 80               | 168826.47    | -1  | 168826.47    |
| <input type="checkbox"/>               | GAIN     | <a href="#">3883</a>    | 90 Day    |              | F   | 5               | 3               | 100              | 15497.59     | -1  | 15497.59     |
| <input type="checkbox"/>               | GAIN     | <a href="#">6782</a>    | 90 Day    |              | M   | 5               | 3               | 100              | 35400.59     | -1  | 35400.59     |

# Systems Administration

**NIH Medical Image Archive System ( NINDS ) - Administration**

[Users List](#) [Logout](#) [Main Archive website](#) [<< Back](#)

---

Title

First Name

Last Name

Job Position

Address

Organization

Email

Phone

Username

Password  ( Minimum 6 characters )

Confirm Password

Access level

---

Note : Applicable if Access Level is " Data Entry Operator ".

☒ **Data Collection**

☒ Patient and Clinical Data

☒ **Download**

Access Privileges ☒ Patient Information ☒ Clinical Information ☒ Images

☒ **Record Locking/ Unlocking**

---

Status

Area Access ☒ Suburban Hospital ☒ GAIN ☒ SIR

Access Count Limit  Times

Access Time Limit  Times

**NIH Medical Image Archive System ( NINDS ) - Administration**

[Users List](#) [Logout](#) [Main Archive website](#) [<< Back](#)

---

Users : 11

[Add New User](#)

| Name                    | Organization | Telephone | Email | User Type               | Status | Access Count Limit | Access Time Limit |                                   |                              |                                |
|-------------------------|--------------|-----------|-------|-------------------------|--------|--------------------|-------------------|-----------------------------------|------------------------------|--------------------------------|
| Suh Edward              | gov          |           |       | Administrator           | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| Administrator           | gov          |           |       | Administrator           | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| Data Entry Operator     | gov          |           |       | Data Entry Operator     | Active | 2 times            | 2 days            | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| H.gov                   | H.gov        |           |       | Data Entry Operator     | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| gov                     | gov          |           |       | Administrator           | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| ov                      | ov           |           |       | View Operator           | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| gov                     | gov          |           |       | Administrator           | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| gov                     | gov          |           |       | Administrator           | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| GOV                     | GOV          |           |       | Administrator           | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |
| Anonymous View Operator |              |           |       | Anonymous View Operator | Active | Unlimited          | Unlimited         | <a href="#">Access Privileges</a> | <a href="#">Edit Profile</a> | <a href="#">Delete Profile</a> |

**Access Privileges**

Name

Suh Edward

Access Level

Administrator

Access Privileges

Data Collection

Patient and Clinical Data

Upload Image Data

Download

Patient Information

Clinical Information

Images

Record Locking/Unlocking

Access Count Limit

Unlimited times

Access Time Limit

Unlimited days

Status

Active

Done

Internet


# Image Upload Tool

NIH Medical Archive System - Upload Tool - Microsoft Internet Explorer

## Upload Tool

**Medical Record # : 402**  
Note : Choose directory from the local computer that corresponds to the Medical Record # and the examination # that is to be uploaded (e.g. C:\MR#\E#).

C:\MIAS\402\04970

 001

NIH Medical Archive System - Upload Tool - Microsoft Internet Explorer

## Upload Tool

**Medical Record # : 402**  
Note : Choose directory from the local computer that corresponds to the Medical Record # and the examination # that is to be uploaded (e.g. C:\MR#\E#).

Please wait gathering files Information ..  
Dirs Stored total entries:12  
Ready for writing  
1. \*\*\*done I.009  
2. \*\*\*done I.008  
3. \*\*\*done I.007  
4. \*\*\*done I.006  
5. \*\*\*done SERHDR.001  
6. \*\*\*done I.005  
7. \*\*\*done I.oly  
8. \*\*\*done I.004  
9. \*\*\*done I.003  
10. \*\*\*done I.002  
11. \*\*\*done I.001

**Upload Complete**



# Image Download Tool

NIH Medical Archive System - Download Tool - Microsoft Inte...

## Download Tool

Medical Record # : 1156310  
Exam No : 1059  
Series No : 1059-1

**Download**

☒ Patient Info    ☒ Clinical Info    ☒ Images

Choose a Directory to save :

C:\1009    **Browse**

Progress :

**Download**    **Cancel**

**Close**

NIH Medical Archive System - Download Tool - Microsoft Inte...

## Download Tool

Medical Record # : 00000  
Exam No : 05254

**Download**

☒ Patient Info    ☒ Clinical Info    ☒ Images

Choose a Directory to save :

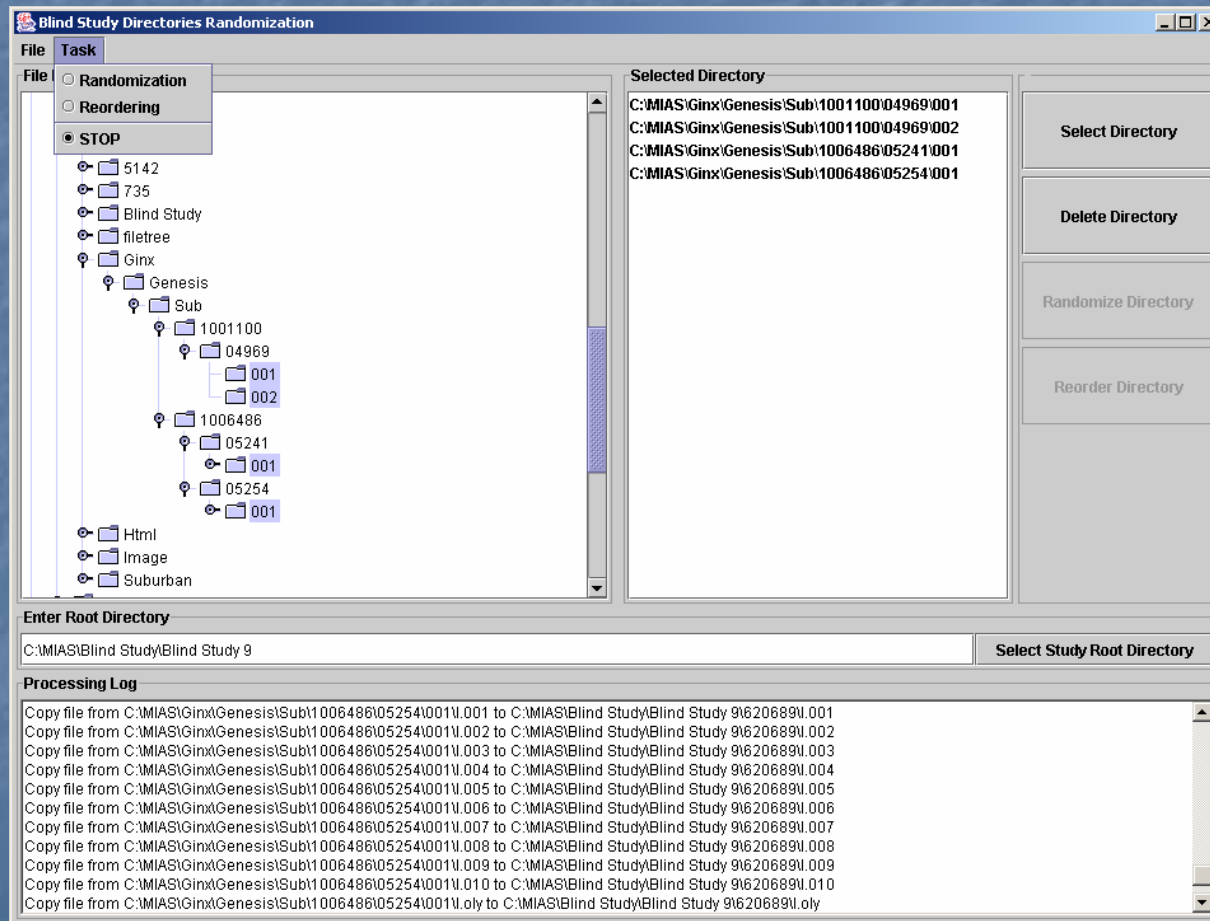
C:\1009    **Browse**

**Download Complete**

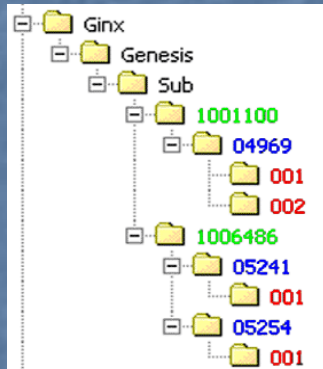
**Download**    **Reset**

**Close**

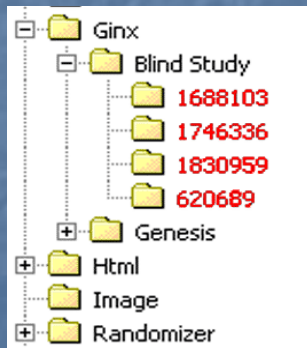
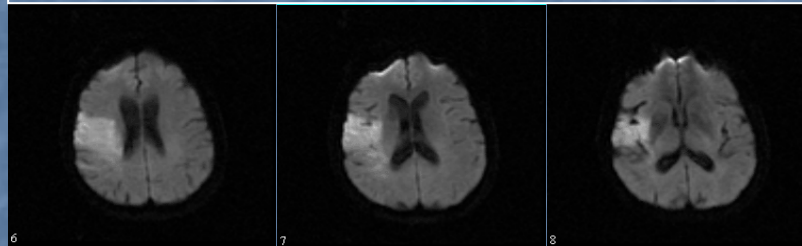
# Patient Info Randomizer (Cont.)



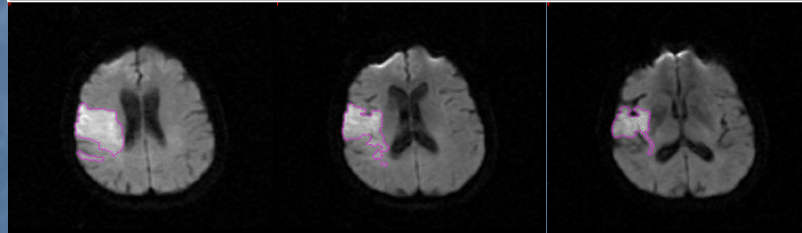
# Patient Info Randomizer



IMFG  
Patient Name: John Doe  
Patient ID: 1001100  
Exam No: 04969



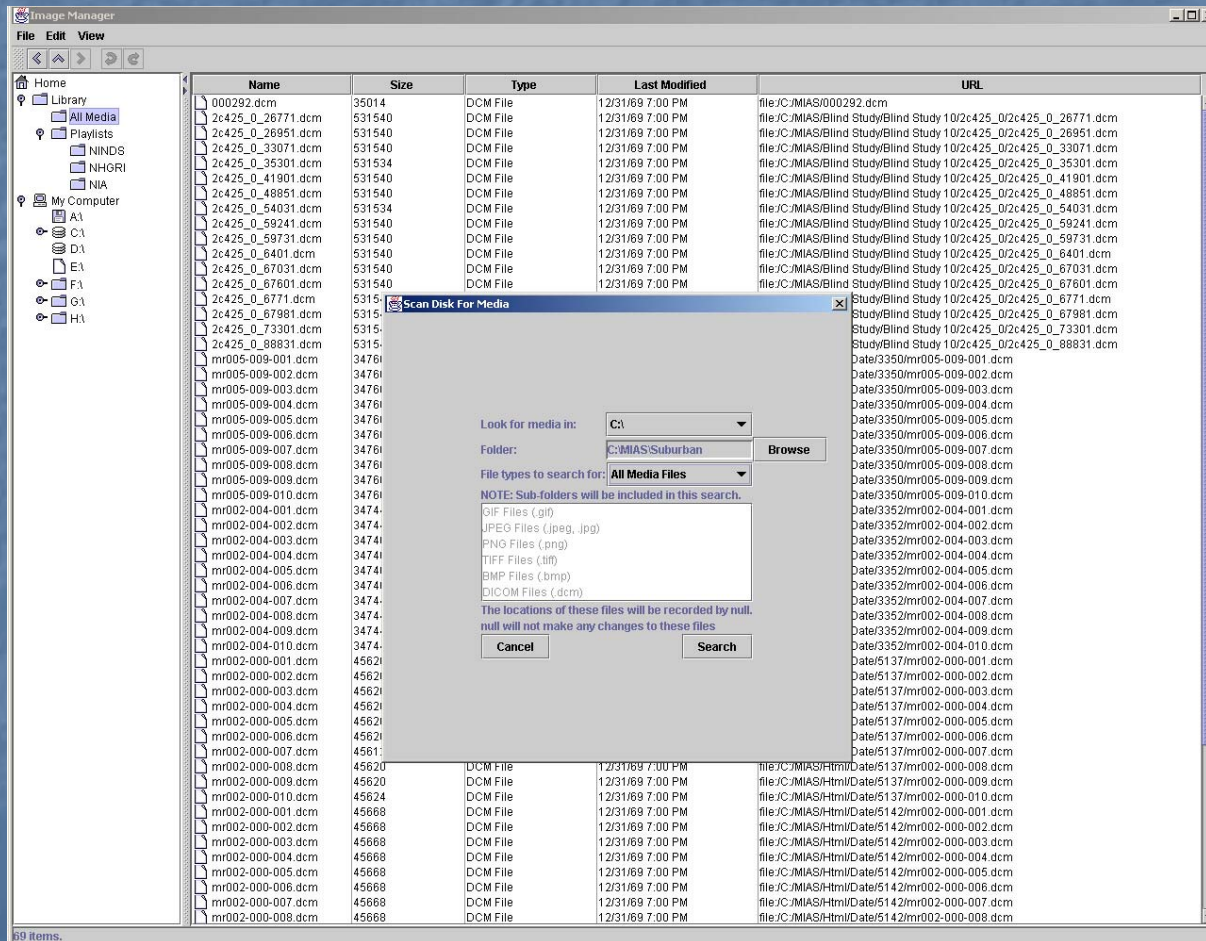
IMFG  
Patient Name:  
Patient ID:  
Exam No:



Microsoft Excel - test.csv

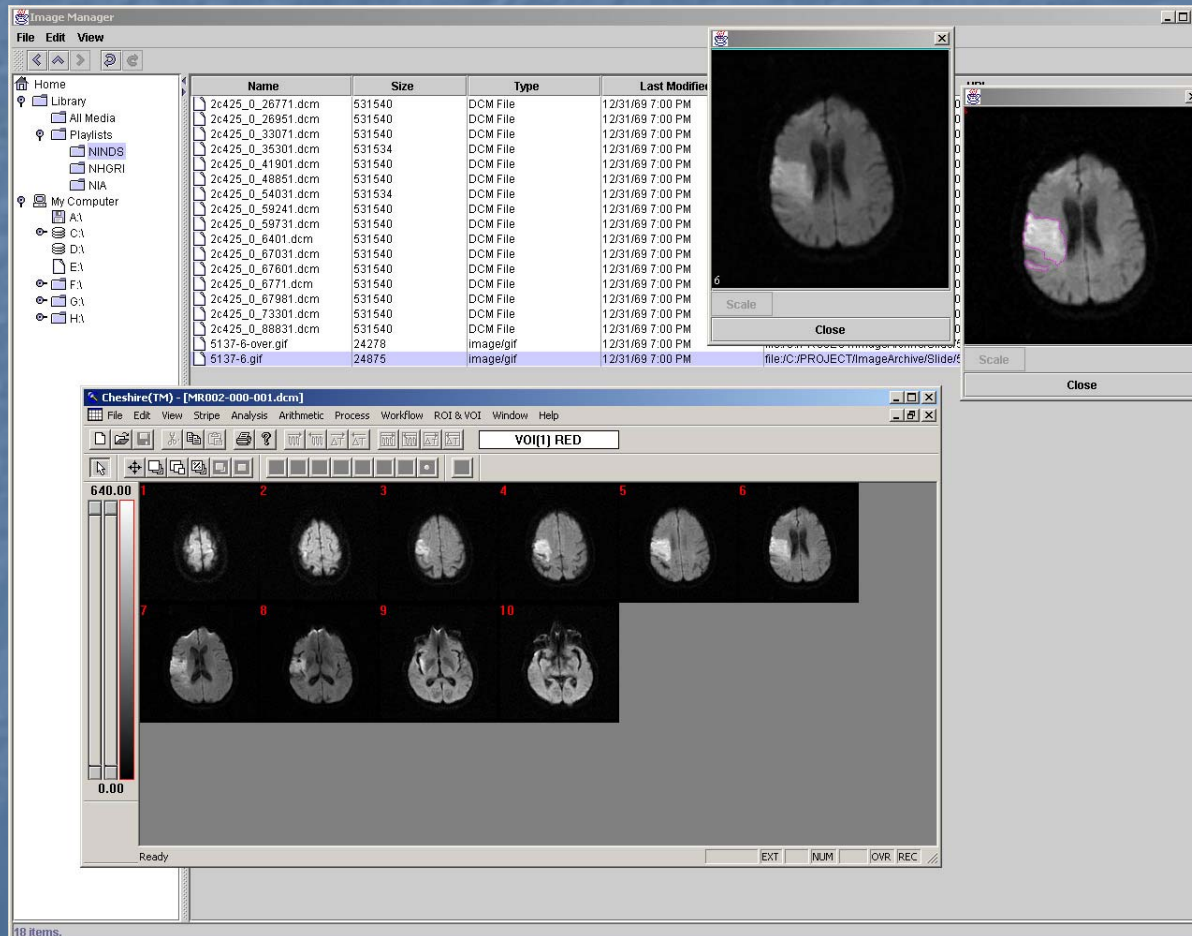
|   | A     | B    | C       | D    | E           | F             | G          | H        |
|---|-------|------|---------|------|-------------|---------------|------------|----------|
| 1 | DOE   | JOHN | 1001100 | 4969 | DWI         | CODE PURPLE   | 11/11/2000 | 11:26:44 |
| 2 | DOE   | JOHN | 1001100 | 4969 | 3-plane loc | CODE PURPLE   | 11/11/2000 | 11:26:44 |
| 3 | SMITH | TEST | 1006486 | 5241 | 3-plane loc | BRAIN MRA/MRI | 12/6/2000  | 10:33:14 |
| 4 | SMITH | TEST | 1006486 | 5254 | 3 Plane LOC | CAROTIDS      | 12/7/2000  | 9:36:35  |
| 5 |       |      |         |      |             |               |            |          |
| 6 |       |      |         |      |             |               |            |          |
| 7 |       |      |         |      |             |               |            |          |
| 8 |       |      |         |      |             |               |            |          |
| 9 |       |      |         |      |             |               |            |          |

# Image File Manager (Cont.)





# Image File Manager



# Summary

- Developed a scalable, secure and high-throughput Web-based medical imaging and clinical trial data repository
- Developed software tools for the patient information anonymization and the image file management

# Future Works

- Develop a data warehousing environment to accommodate and manage medical imaging and clinical trial databases
- Develop content-based image retrieval, data mining and visualization tools

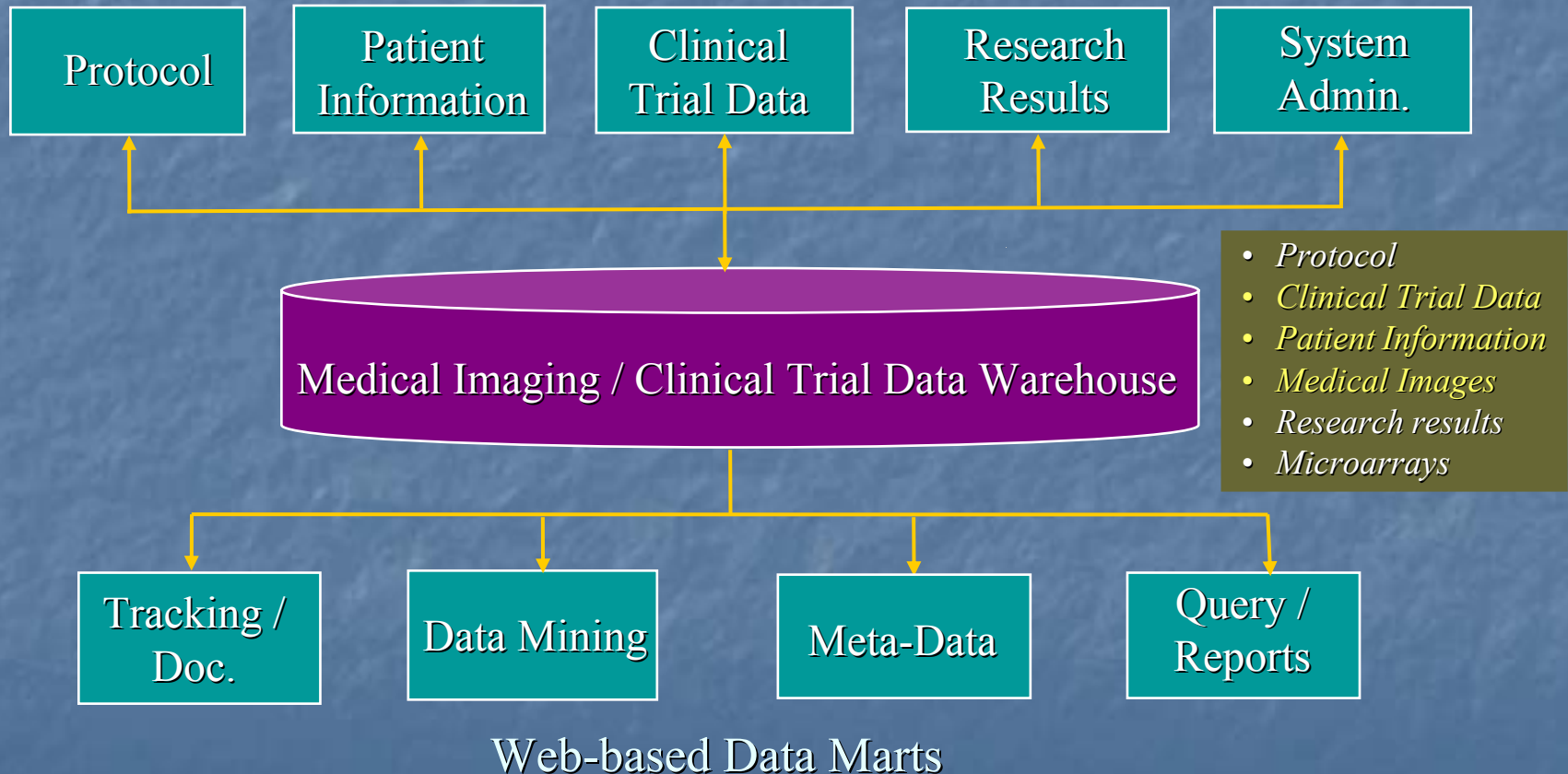


*Thank you!*

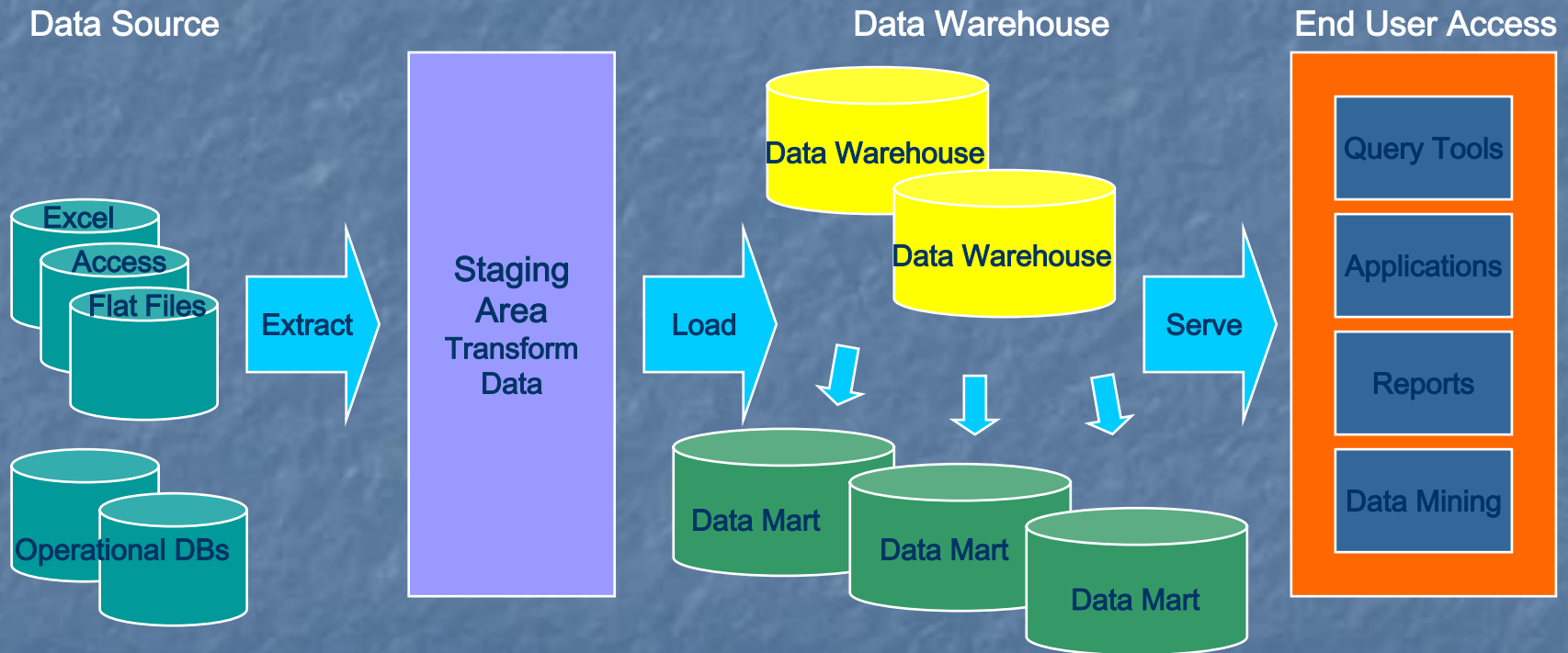


# Clinical Info. Mgmt. System

## Web-based Transaction System



# Data Warehouse Architecture



# Meta-data Repository

